

## CLAIMS

The invention claimed is:

1. A semiconductor package comprising a solder having an alpha flux of less than 0.001 cts/cm<sup>2</sup>/hr.
2. The semiconductor package of claim 1 wherein the solder predominately comprises Ag, Bi, Cu, In, Pb or Sn.
3. The semiconductor package of claim 1 wherein the solder predominately comprises Ag.
4. The semiconductor package of claim 1 wherein the solder predominately comprises Sn.
5. The semiconductor package of claim 1 wherein the solder is substantially lead-free.
6. The semiconductor package of claim 1 wherein the solder is lead-containing solder that is at least 99 weight% lead.

7. The semiconductor package of claim 6 wherein the lead-containing solder has an alpha flux of less than  $0.0005 \text{ cts/cm}^2/\text{hr}$ .
8. The semiconductor package of claim 6 wherein the lead-containing solder has an alpha flux of less than  $0.0002 \text{ cts/cm}^2/\text{hr}$ .
9. The semiconductor package of claim 6 wherein the lead-containing solder has an alpha flux of less than  $0.0001 \text{ cts/cm}^2/\text{hr}$ .
10. A lead-containing anode having an alpha flux of less than  $0.001 \text{ cts/cm}^2/\text{hr}$ , the lead-containing anode comprising at least about 50 weight% lead.
11. The lead-containing anode of claim 10 having an alpha flux of less than  $0.0005 \text{ cts/cm}^2/\text{hr}$ .
12. The lead-containing anode of claim 10 having an alpha flux of less than  $0.0002 \text{ cts/cm}^2/\text{hr}$ .

13. The lead-containing anode of claim 10 having an alpha flux of less than 0.0001 cts/cm<sup>2</sup>/hr.

14. A lead-containing solder bump having an alpha flux of less than 0.001 cts/cm<sup>2</sup>/hr, the lead-containing solder bump comprising at least about 50 weight% lead.

15. The lead-containing solder bump of claim 14 having an alpha flux of less than 0.0005 cts/cm<sup>2</sup>/hr.

16. The lead-containing solder bump of claim 14 having an alpha flux of less than 0.0002 cts/cm<sup>2</sup>/hr.

17. The lead-containing solder bump of claim 14 having an alpha flux of less than 0.0001 cts/cm<sup>2</sup>/hr.

18. A lead-containing solder paste having an alpha flux of less than 0.001 cts/cm<sup>2</sup>/hr, the lead-containing solder paste comprising at least about 50 weight% lead.

19. The solder paste of claim 18 having an alpha flux of less than 0.0005 cts/cm<sup>2</sup>/hr.
20. The solder paste of claim 18 having an alpha flux of less than 0.0002 cts/cm<sup>2</sup>/hr.
21. The solder paste of claim 18 having an alpha flux of less than 0.0001 cts/cm<sup>2</sup>/hr.
22. A method of refining a lead-containing material, comprising:  
providing an initial composition of the lead-containing material, the initial composition having an alpha flux of greater than or equal to 0.002 cts/cm<sup>2</sup>/hr; and  
purifying the lead-containing material to form a second composition of the lead-containing material, the second composition having an alpha flux of less than 0.001 cts/cm<sup>2</sup>/hr.
23. The method of claim 22 wherein the purifying comprises one or more of electro-refining, zone refining and chemical refining.

24. The method of claim 22 wherein the purifying comprises electro-refining utilizing a bath comprising nitric acid and water, with the nitric acid being present at a concentration of from about 2% to about 50%, by volume.
25. The method of claim 22 wherein the purifying comprises electro-refining utilizing a bath consisting essentially of nitric acid and water, with the nitric acid being present at a concentration of from about 2% to about 50%, by volume.
26. The method of claim 22 wherein the lead-containing material of the second composition is at least 99.99% lead by weight.
27. The method of claim 22 wherein the second composition has an alpha flux of less than 0.0005 cts/cm<sup>2</sup>/hr.
28. The method of claim 22 wherein the second composition has an alpha flux of less than 0.0002 cts/cm<sup>2</sup>/hr.
29. The method of claim 22 wherein the second composition has an alpha flux of less than 0.0001 cts/cm<sup>2</sup>/hr.